DATA PROCESSING DIGEST

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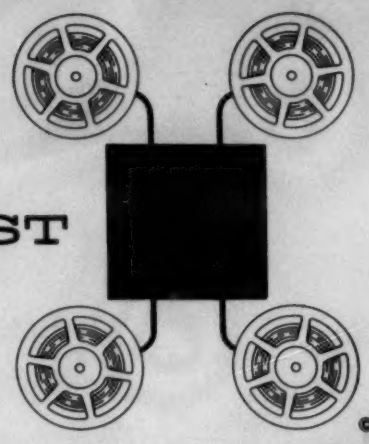

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General Information

FROM THE THOUGHTFUL BUSINESSMAN

HARVARD BUSINESS REVIEW, November-December 1960; pages 16-22

In this letters-to-the-editor feature, Mr. Gilbert E. Jones, President of Data Processing Division of IBM Corporation disputes the findings of Dr. Ida Russakoff Hoos ((DPD: September 1960, page 3, "When the Computer Takes Over the Office")) regarding the detrimental effects of EDP on the employee and the management strata of business. Taking Dr. Hoos' points one by one, this is how Mr. Jones answers her:

1. The impact of EDP on the number of jobs. In the NOMA survey ((DPD: January 1960, page 12, "NOMA Survey")), it was found that out of more than 2500 persons whose jobs were affected by the introduction of computing equipment, less than 1% were laid off. The Monthly Labor Review ((DPD: December 1960, page 7, "Experiences with the Introduction of Office Automation")) summarized last April its study of 2808 employees affected by large business computers. Only 9 were dismissed.

2. Unimpressive salaries. Philip H. Weber and Co., specialists in wage and job classification analysis reported in Management and Business Automation ((DPD: August 1960, page 5, "National Survey of Computer Department Salaries")) that of the four professional levels of programer beyond the beginner-trainee, only the lowest averaged under $7000.

3. Downgrading. In the Department of Labor study: "Close to one third of the employees in the affected group had been promoted to a higher grade. A negligible number had been downgraded." Mr. Jones says: "The organic nature of a healthy business organization has long been understood. Stable growth must be based on occasionally shifting organization and communications relationships and if these changes affect middle management or even vice presidents, there is no occasion for alarm. The only real threat to a dynamic business is stagnation and fear of change."

CONTENTS

4. Personnel work devalued. "There are plainly many acceptable variations in the relationship between personnel and operating areas. It is quite conceivable, for example, that a data-processing manager would be eminently qualified to undertake the training of programers and machine operators as well as their recruitment."

5. Anti-human relations. "Our systems... are no threat to, but are a hope for, our society. Even now we can foresee that their use is capable of perceptibly flattening out the peaks and valleys of the business cycle via the application of optimized inventory control on a massive basis. And this one great boon, impossible without the computer, may far outweigh all the minor and temporary dislocations of the transition to electronics.... We do not yet know all the answers and some temporary hardships are probably inevitable while we are still seeking them. Nevertheless, with intelligence and humanity, it should be possible to contain and minimize problem situations."

DETERMINING SALARIES FOR COMPUTER PERSONNEL

Philip H. Weber, P. H. Weber and Co., Chicago, Ill.
Published by MANAGEMENT AND BUSINESS AUTOMATION

A complete manual for use in setting salaries for computer personnel is based on a nationwide computer personnel salary survey made by MANAGEMENT AND BUSINESS AUTOMATION ((DPD: August 1960, page 5, "National Survey of Computer Department Salaries")). The manual is in three parts: 1) an introduction to the basic problems of employee compensation; 2) a step-by-step outline for development of an evaluation program; 3) a complete manual with detailed information on position descriptions, rating scales, position grades, salary ranges and administrative procedures for a complete evaluation program.

In this last portion, charts and graphs are provided for establishment of a wage scale in the geographic area, and suggested forms to be used for setting up the system and evaluating performance. To obtain a copy of the manual, write to the Research Bureau of MANAGEMENT AND BUSINESS AUTOMATION, 600 West Jackson Boulevard, Chicago 6, Illinois. Price of the manual is unknown.

AUTOMATION: HOW MUCH, HOW SOON?

CHAIN STORE AGE, November 1960; pages E21-E25, E35

Chain stores are beginning to use solid state computers at an increasing rate, although a handicap is still the need for good point-of-sale recorders. The National Association of Shoe Chain Stores has been doing research in the area for five years, and is currently testing a recorder which creates a hard-copy tape.

ARE WE FALLING BEHIND IN MECHANIZATION?

James R. Bright
HARVARD BUSINESS REVIEW, November-December 1960; pages 93-106

Dealing generally with the thesis that the U.S. is not advancing properly in mechanization, both in the plant and in the office, the author speaks in this way about EDP, specifically: "In my opinion, the most significant trend in mechanization is the merging of data-processing systems with production machinery." Examples described in the article of computer controlled power plants, punched-card actuated feed mills, mechanized order picking and automatic inventory recording illustrate the linking of production processes and the office. The significant aspects of this are a speed up of the response of the manufacturing system to the demands of the business environment, reduction of inventories and warehousing facilities, improvement in customer service, reduction of clerical overhead, and the necessity for top management to plan the business as a system.

AUTOMATIC DATA PROCESSING

NAVY MANAGEMENT REVIEW, October 1960

The entire issue is devoted to an evaluation of the Navy's ADP program. While not as far along as anticipated, the Navy believes it has gained invaluable experience, which will enable it to attain its projected Stage Five as planned. This stage sees electronic data processing becoming more a management tool and less a mere data processing tool. Some criteria for equipment replacement are suggested, and several programs in material and personnel management are described. This issue may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

WHAT EVERY BOSS SHOULD KNOW ABOUT E.D.P.

SYSTEMATION, November 15, 1960

ORGANIZING FOR E.D.P.

SYSTEMATION, December 1, 1960

These two issues of SYSTEMATION comprise a concise outline of EDP study and investigation for the executive who has yet to consider electronics in his organization. They are written in the conversational style typical of this publication, by guest editor Maurice F. Ronayne, of the U.S. Department of Labor. Good for the manager who won't read books.

THE COMPUTER JOURNAL CONFERENCE ISSUE

October 1960

Papers presented at the Second Conference of The British Computer Society in July, 1960, are contained in the October issue of the Society's Journal. Among the technical papers are several of a business nature, including the use of a LEO II for the government pension plan, on market analysis, an IBM 705 in the Royal Army Pay Corps, a National-Elliott 405 in a paper manufacturing company, and a Pegasus II in Martins Bank. Papers on a university computing center, automatic coding, computing in Russia, and process control are also included.

THE SOVIET TRAINING PROGRAM FOR AUTOMATION AND COMPUTER SPECIALISTS

U.S. Department of Commerce, Office of Technical Services Report #60-21187 (50c)

A four-page report on Russian plans for training computer specialists indicates that computer education is given high priority for the next ten years, and that courses and institutions have been set up for this purpose. It is believed that the Soviet training in automation and control is of high quality.

((The report may be ordered from the U.S. Government Printing Office, Washington, D.C.))

HANDBOOK ON DATA PROCESSING METHODS, PART I

Published by the United Nations

The first of a group of collected studies on data processing has been printed by the Food and Agriculture Organization of the United Nations. The purpose of the projected twelve studies (five of which are contained in this booklet) is to provide less developed countries with information on data processing to assist them in gaining experience in the processing of statistical data. Most of the specific information has to do with punched card installations. The general introductory material defines the meaning and use of data processing. For information on ordering a copy of the studies, write to Statistical Office of United Nations, New York City. Price of Part I of the published studies is unknown.

Applications

CREDIT ON EQUIPMENT MAKER'S MANAGEMENT TEAM FOR AUTOMATING ACCOUNTS RECEIVABLE

H. L. Peterson, Minneapolis-Honeywell Regulator Co., Minneapolis
CREDIT AND FINANCIAL MANAGEMENT, November 1960; pages 12, 13

In placing their credit function on their own DATAmatic, Minneapolis-Honeywell required the computer provide:

1. High speed machine processing of debits and customer payments.

2. Readily available "by customer" reports containing essentially the same data available on the existing ledger card.

3. The ability to answer credit inquiries.

4. Monthly aging of all accounts receivable by sales divisions and branch territories.

5. Automatic credit approval.

6. Open item or past-due customer statements on a monthly basis.

7. Automatic print-out of past-due accounts.

One important benefit of the system is the reduction of past-due receivables as a result of more effective collection follow-up.

EDP FOR MISSILE MANAGEMENT

Col. Alan G. Haemer, Vandenberg AFB, California
THE ARMED FORCES COMPTROLLER, December 1960; pages 23-25

The vast management system surrounding and implementing the missile program is described. It is necessary to know at any one time what has to be done, the time required to make a repair, what personnel are available, what tools are needed, what parts are needed and available. This vast scheduling job is being handled by a computer system with two main files: 1) job file, organized by missile, containing all jobs that will be performed on a particular

missile; 2) the resources available to perform the jobs. The action agencies will feed data into storage through the processing units. The processor will then search storage for all unaccomplished jobs, allocate the resources to these jobs in an optimum fashion, and print out the work order. After the work is done, data from the completed work order will be fed back to the processor which will then update the files and perform required analyses.

The Electronic Missile Management System consists of a central computer located in a Data Processing Center, designed and operated to provide data processing service to all major functional areas that have a need for this service. Remote input and output devices will be located within the operating sections and will be tied directly to the computing center. The operating sections will be able to make direct inquiry of the computing center for data needed in their operations.

ELECTRONICS—A NEW WORLD IN BANKING

John N. Raleigh, U.S. National Bank of Portland, Oregon
AUDITGRAM, November 1960; pages 4-8

The EDP system at the U.S. National Bank of Portland works around the clock. The bank found many people prefer to work at night, and housewives and students welcome evening jobs as part-time income-boosters. Where work runs beyond midnight, professional fulltime operators are employed. The need for supervision is less in an electronic system, and many of the bank's operations have no supervision at all, but work on the "exception" rule. If the computer develops a "bug" during the part-time operator shift, the supervisor will stay over the next evening to instruct the operator in coping with the problem. Experience has shown that two or three evenings a month suffice to keep things running smoothly. The entire atmosphere has changed wherever the bank has installed the electronic system in its branches. People have been upgraded and feel that dignity has been added to jobs that once offered only frustration.

ANIMAL RECIPES BY COMPUTER

AUTOMATIC DATA PROCESSING (Brit.), November 1960; pages 18, 19

Crosfields and Calthrop Ltd are cattle feed manufacturers in Liverpool. They are using a computer to work out linear programing methods of buying and mixing products for animal feeds. The program will eventually provide buyers with a daily guide of what to buy, according to availability and price, and will evolve recipes which conform to nutritional and technical requirements and are the most economical. The company's installation is primarily intended for linear programing, and will justify its existence on this application alone.

EPIDEMIC AT THE CHEMISTS

AUTOMATIC DATA PROCESSING (Brit.), November 1960; pages 20-22

Boots Pure Drug Co. Ltd. has been using an Emidec 1100 since last September to process warehouse orders sent in by the retail stores. A special order book with mark-sense cards was designed. The computer is used as a gigantic log book for the 60,000 lines carried, and makes adjustments to the log as goods are added or removed from the warehouse. The machine processes the branch order to: 1) sort out the items of the order in picking sequence, 2) make adjustments to the totals of stocks held, 3) print out an extended invoice for the branch to be sent with the order. Out-of-stock items are remembered and supplied automatically when the items are again in stock. Boots anticipates that the inventory records in the computing system may lead to automatic distribution on the fastest moving items, providing management with sales control information which will eliminate the need for point-of-sale recording.

Equipment

PUSH BUTTON OFFICE

AUTOMATIC DATA PROCESSING (Brit.), October 1960; pages 17-19

A prototype order processing system called Direct Order Recording and Invoicing System (DORIS) has been installed by the marketing division of the Shell and British Petroleum companies at Royston, Hertfordshire depot. The system consists of punched paper tape processors and a series of seven panels, containing a button for each of a potential 3000 customers, and an eighth panel of buttons for each product, quantities, days of delivery, and other ordering information.

More than 85% of the orders come into this panel by telephone. The clerk taking the order sets it up on the panel and presses an "end of order" button. The order is recorded by the system on paper tape which is read automatically to produce the necessary documents. Full information about the customers and products is stored on three reels of seven-channel strengthened paper tape. The system, activated by the original paper tape punched when the buttons were depressed, seeks out the information relating to the order from the three reels. Description and price of the product are printed out on sales tickets and invoices simultaneously, including the extensions and totals.

At the same time the system makes a permanent record of the invoice information on paper tape for accounting and statistical needs. The tapes are overprinted with the sales ticket serial number for easy identification in storage when the customer has received his order. At this time the tape is used to summarize sales information. The detail and summary tapes are then used for further processing at headquarters.

Programing and Operation

HOW TO RUN THE COMPUTER DEPARTMENT

P. M. Bridgman, Urwick Diebold Co.
AUTOMATIC DATA PROCESSING (Brit.), November 1960; pages 14-17

The secret of successful computer department management is scheduling, particularly when the installation must take care of business applications which require long, regular runs, and scientific applications, which may be short spur-of-the-moment runs. Scheduling should be the responsibility of the computer department manager and should be done for about a month ahead, with provisions for revising the schedule for changes in priorities, re-runs and breakdowns. Scheduling must take into account debugging time, phasing with non-computer work, estimates of run-times, and equipment efficiency. Even if the work amounts to only two or three hours a day, it should be scheduled, and subsequent performance should be checked against the schedule, in order to keep the status of the computer department one of production rather than research and development.

Schedule every run

A run book containing the operating instructions for each run should be kept in the computer room. A production or job order should be issued as a control, and this document can also serve as a routing slip for the work flow. The operator should keep a log of every activity on the computer, including loading and unloading, maintenance times, and every interruption that occurs, no matter what it may be. This log can be used later, along with the program test production run orders, to check on the quality of the programing work, and the general efficiency of the installation.

Information Retrieval

DOCUMENTATION, INDEXING AND RETRIEVAL OF SCIENTIFIC INFORMATION

Prepared by the Staff of the Committee on Government Operations, U.S. Senate, 86th Congress, 2nd Session, Doc. #113.

As stated by the committee this document reviews information retrieval in four areas:

1. "The present status of systems and equipment relating to assembling, translating, indexing, abstracting, storing, processing, receiving, and disseminating scientific and technological information now in operation or being developed within Federal agencies....

2. Programs ((of a similar nature)) by recognized authorities...outside of the Government.

3. Descriptive data...from representative designers and manufacturers.

4. Reports from certain selected private industries as to progress they have made...with recommendations for improvement of Federal operations in this area."

Overall view of I.R.

This 283-page document provides an excellent review of the systems in operation and proposed for the storage and retrieval of scientific information. The document starts out with a section reviewing the need for a better dissemination of scientific information in the United States. Although some Federal agencies, particularly the AEC, CIA, ASTIA, Patent Office and National Library of Medicine, are making progress, other agencies are not "placing proper emphasis" on this area. The difficulty in evaluating the claims of various manufacturers and designers of information retrieval equipment is noted. The justification given for the need for improved scientific information retrieval in this country is ((unfortunately)) by a comparison with activities in Russia and not by a positive statement of the needs of this country. A summary of the activities of various government agencies is then presented.

Federal agency activity

The main body of the report has two parts. Part I reviews the activities and programs of Federal agencies in some detail, describing the methods of indexing used, the equipment available and other pertinent data. Part II of the report covers scientific information retrieval systems and programs in non-government groups. In addition to most of the large equipment manufacturers, the work being done at the American Institute of Biological Sciences, Chemical Abstract Service, McGraw-Hill Publishing Co., Stanford Research Institute, and Western Reserve University are reviewed. A good description of the information retrieval problem is presented by Mr. Eugene Wall of DuPont ((see DPD, this issue, page 10)).

I.R. is economic problem

These sections review the indexing and equipment developments of the various companies, and in some cases include specific proposals for handling the national scientific information problem. The report of Mr. Frederick Jonker of Jonker Business Machines, Inc., points out: "The National information problem is an economical rather than technical problem. Many successful techniques... are already available. The problem is to find techniques and equipment low enough in cost and simple enough to be acceptable for mass utilization...." He proposes the use of English language indexing using "keyword or key concept" techniques ((see DPD, this issue, page 12)). It is pointed out that "the information flow problem is... not the problem of flow of information itself, but the flow of index information." Microfilm and other techniques may be sufficient for retrieving the document itself. The difficult step is to learn of the document's existence through the proper indexing methods.

This report should be read by anyone interested in obtaining, more quickly and cheaply, data pertinent to scientific studies in any area in which he may be working. It is unfortunate that the committee report does not present specific conclusions and recommendations for action by the Federal government in this vital area. Document #113 may be ordered from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Price, 70¢.

A PRACTICAL SYSTEM FOR DOCUMENTING BUILDING RESEARCH

Eugene Wall, E. I. duPont, Wilmington, Delaware

Reported in DOCUMENTATION, INDEXING, AND RETRIEVAL OF SCIENTIFIC INFORMATION, U. S. Senate, Committee of Government Operation, Document No. 113, 1960 (70¢); pages 180-202

All information retrieval systems work on the same basic principles. It is always possible to "make a system work." "The economics... are markedly affected by how well... principle and technique are handled."

The choice of a specific machine is "a tactical matter;... the machine should be made to fit the system." What are these principles and techniques? Information storage and retrieval is a problem in communication among three groups: 1) the originator of information, 2) the indexer, who decides how the information is to be stored away so that it can later be retrieved, 3) the searcher. "Two basic facets of communicative problems are significant:... feedback of information [and] degree of abstractness." Feedback involves the notion of two-way communication. A conversation has nearly full feedback; a newspaper less so, technical papers even less; history and archeology almost none. "Presence or absence of 'feedback' and the 'process time-constant'... determine how easy it is to achieve effective communication... the transmission of meaningful knowledge."

Feedback and abstractness

The "degree of abstractness" is a measure of the "degree of abstract thought required in employing the information." Data has a low degree of abstraction, technical concepts medium to high, music very high.

Information retrieval deals with the center of the two-dimensional feedback--abstractness plane; that is, with reasonably abstract concepts reported by media which permits little feedback. ((Retrieval of data is vital too, but is not the subject of the paper.))

Technical problems in I.R.

There are three problem areas in IR: technical, economic and "political." The technical problem can be divided into four areas:

1. Viewpoint. Individuals contemplate objects, ideas, facts with different viewpoints, making words subject to misinterpretation.

2. Generic. This is a problem concerned with family tree of concepts. A search referring to broad concepts should effectively retrieve information referring to narrower but related or subordinate concepts. When combinations of concepts must be considered tree relationships are complicated.

3. Semantic. This concerns the relationship between words and their meanings (including synonyms, homographs, etc.). This area leads to the need for cross-references.

4. Syntactic. This relates to the ordering or arrangement of words and the changes in meaning of a group of words which may result from modification of the relative order.

Solutions for these areas must be flexible enough to handle as yet undefined terms.

There are two basic approaches to solving these technical problems: prescribe a vocabulary or use redundancy. Prescribed vacabularies work only if the collection of documents is small or the field covered is narrow, or the number of users is small. Otherwise, redundancy must be used, either by indexing under all possible viewpoints (at the input) or by searching redundantly (at the output). "This choice depends purely on economics."

Indexing by "Uniterms"

The redundant index can be obtained by proper use of a thesaurus. The indexer describes the document by words or phrases according to those used by the author, by himself and by others from the thesaurus. Documents would be indexed by "Uniterms." "The use of unit-concept terms [does have] one serious ((syntactical)) disadvantage." For example, search for "cooling of water" also retrieves "water cooling." This is solved by expanding terms to include "role indicators." Two roles here might be "use of" and "receiving an action." Thus, "use of water for cooling" is distinguished from "cooling of water." Sometimes terms are subdivided by as many as twelve roles.

Finally, the "tactics" of implemation require a choice as to how to group index items--by items or terms. The former requires a search of all items; the latter ("prefiled") system requires a search of only those items indexed by pertinent terms--usually a more economic approach.

The steps of the IR system then are:

1. Assigning an address or accession number to the document.

2. Indexing by: analyzing information content, identifying concepts and evaluating their importance, assigning terms and role indicators per content and as the indexer sees justified (all highly intellectual and expensive steps).

3. Searching. The method depends upon the physical form of the index--manual cards, printed or machine form. The search gives pertinent accession numbers.

4. Making available abstracts of documents identified by the search.

JONKER'S APPROACH TO INFORMATION RETRIEVAL

MANAGEMENT AND BUSINESS AUTOMATION, November 1960; pages 18-25

Jonker Business Machines, Inc., in Gaithersburg, Maryland, produces information retrieval machines and equipment for the smaller, but time-consuming and frustrating information retrieval problems. The system is called "Termatrex" and is similar in principle to the "Peek-a-Boo" method. An item (for example, an employee in a personnel file system, or a scientific paper in a library system) is given a serial number. Cards are set up for the terms under which any search might be made (for example, education and particular talents in the case of the employee). All the term cards relating to the item being filed in the system are pulled from the file, stacked, and punched in the coded spot reserved for the item's serial number.

When a search is to be made, all the term cards which describe the subject at hand are pulled and superimposed. The item or items having all the desired characteristics are immediately discernable by the quite obvious holes showing up in the stack of term cards. The system is both simple, and easily maintained without mechanical equipment, although the company is designing equipment which can handle quantities of the cards and manipulate them in more sophisticated ways.

IMPROVED DATA STORAGE AND RETRIEVAL FOR ARMY TACTICAL INTELLIGENCE

Martin Frishberg, Ramo-Wooldridge, Canoga Park, California
Paper presented at ACM Conference, Milwaukee, August 1960

A method for reducing redundancy in the storage of information is described. Such reduction is necessary in the military field, where computing equipment must be mobile and compact. In developing the method, more than 100,000 words of military intelligence material were tabulated to determine the frequency of use of words and letters. A list of 240 most frequently used words was divided into four sets of 60 words each. A six-bit code (yielding 64 combinations) was assigned to each word. The four remaining codes were used to indicate that a word not on the primary list would be found in one of three other lists or is spelled out because it does not appear on a list. The code for the word so designated follows the list code.

Another technique is used for alphabetic characters, numeric digits, punctuation, and control symbols. These are divided into three sets of sixteen, designated as Sets A, B, and C. Four bits are required to specify a character within a set and, as with the Word List, special control symbols indicate when Set B or C is being used.

By these techniques data can be compressed by a factor of 2.4.

Management Sciences

GAMES DECISIONS AND INDUSTRIAL ORGANIZATION

M. Shubik, General Electric Co., New York
MANAGEMENT SCIENCE, July 1960; pages 455-474

"The theory of games. . . . was conceived of as an applied mathematics with economic and possibly other behavioral sciences as the substantive fields for application. How well has it lived up to this ? . . . . There have been almost no direct applications of game theory. . . in sciences or business in the same way as there have been applications of linear programming," but there have been a number of military applications.

Game theory embodies five very different developments:

1. The theory of solution for two-person constant-sum games ((situations in which total value is constant))

2. The description of the extensive form of a game

3. The theories of solution for n ((many)) person games

4. The theories of solution for games against nature ((games in which the rules are not completely specified))

5. The theories of solution for dynamic games.

Two-person constant-sum games can be represented by a payoff matrix:

Player 1 \ Player 2 Specific Strategies	1	2	Row Minima
1	7	4	4
2	8	6	6 maximin
Column Maxima	8	6	

minimax

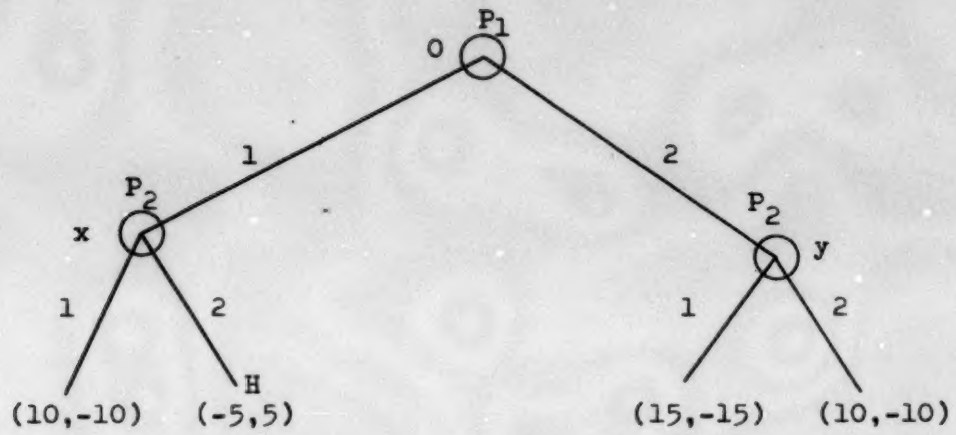
The numbers in the table assign "a value to the outcome of the game for the first player."

The behavioristic assumption for the play of two-person constant-sum matrix games is that of minimax. The game in Table 2 illustrates this.... The worst that can happen to Player 1 if he uses his first strategy is that he obtains 4. The worst that can happen if he uses his second strategy is that he obtains 6....Similarly, by utilizing his second strategy the second player can guarantee that he will lose at most 6....

"The fundamental theorem of two-person constant-sum games establishes that for all games of this type there will be a... [point] at which the first player can guarantee a minimum gain for himself. The second player can simultaneously guarantee that the maximum the first player will win is precisely that minimum ((the minimax strategy))."

But "there are a few situations or organizations which can be characterized successfully by means of two-person constant-run games."

Von Neumann and Morgenstein (reference 1) developed a "detailed description of the anatomy of a game" in the "extensive form." This form "can be represented by a game tree."



The rules tell the structure

"The rules of the game specify the complete structure of the game. They indicate the span of the alternatives faced by a player at any point during the play, his information state and the payoffs resulting from any play.

"A play of a game is a path followed down the game tree. In [the] Figure [above] such a path is denoted by O x H. This results when the first and second players make their moves by selecting their first and second alternatives, respectively.

"The payoff is the resultant allocation from the play of a game. In chess this is the value attached to a win, loss or draw, in poker it is money.

"A strategy is a complete plan of action for a player. It contains instructions to handle all contingencies. For example, 'If Player 1 uses his first alternative my move will be to select my second; if he uses his second my move will be to select my first.'

"A move is the selection of one among a set of alternatives at a choice point in a game. In a game in which each player has a single move and these are made simultaneously, a strategy and a move are equivalent. The players have no contingencies to plan for.

"The game illustrated in the figure has perfect information. Each information set is a one element set. This implies that at any point in the game any player is perfectly informed about all moves made up to the time of his move." ((Such is not always the case))

General References

1. Von Neumann and Morgenstein. Theory of Games and Economic Behavior, 3rd edition, Princeton University Press, 1953
2. McDonald, J., Strategy in Poker, Business and War, W. W. Norton & Co., New York, 1950
3. Luce, R. D. and H. Raiffer, Games and Decisions, Wiley & Sons, New York, 1957.

Points of Interest

SABE Data Processor, the newsletter for the Society for Automation in Business Education, has made its initial appearance. The newsletter will provide business teachers, educators, and businessmen with an understanding of the aims of the organization, a channel for interchange of ideas among the membership, and encourage the members to promote the purpose of the organization. A portion of the newsletter will be devoted to directing business educators to published information about automation for their own and their students' benefit. For information about SABE or the newsletter, write to: E. J. Haga, Assistant Professor of Business, Stanislaus State College, P. O. Box 1000, Turlock, California.

The Naval Ordnance Laboratory in Silver Spring, Maryland, is using an IBM 704 and a single roll of magnetic tape for library searches which used to take more than a week. Now they are made in 15 minutes at a cost of about $1.25 per query.

The C-E-I-R/RCA/NBC election projections were based on an elaborate interlacing of facts and relationships, beginning with a "base-line projection" which incorporated all available information before the election, voting characteristics of key precincts, and a "time curve" for each state which indicated how each state voted in the past, hour-by-hour.

The Kaiser Center in Oakland, California, contains two Remington Rand Univac Solid-State computers which will provide the 60 affiliated Kaiser companies with the facilities to handle their wide range of computing requirements, from scheduling to complex engineering problems to advanced operations research and management science.

C-E-I-R Ltd will open the London Research Center in May with IBM 7090 and IBM 1401 computing systems for use by government and commercial clients in Britain and Western Europe. The services will include complete research, programing, computer services, and computer rental on job or hourly basis.

The Productograph, introduced by Farrington Manufacturing Co. is an electric control system which links all operating stations or machines to a central console. Essential operating data are automatically relayed from these machines to the control center via electromechanical connections. At the console, the facts are recorded on tape and simultaneously displayed on a series of charts and graphs, which show vital statistics such as which machines are in use, how many units have been turned out, etc. Units in use have proved extremely useful in speeding up slow-downs caused by poor materials handling and other factors.

(From Prentice-Hall Report on Business, November 5, 1960)

The A570 check digit verifier has been introduced by Burroughs to virtually eliminate human error in encoding account and other reference numbers into punched paper tape. The small computer is about the size of a portable radio and is cable-connected to Burroughs accounting machines. It sells for $1350.

John Diebold & Associates have found that 131 state, city, and county governments have installed computer systems, mostly small-scale. State government installations account for about 80%. There are about as many computers on order as there are systems installed.

The National Cash Register Company was host to 17 commercial and government National 304 users recently, to organize the group for interchange of information, programing techniques, and systems analysis. Four National Data Processing Centers were also represented.

Comment

COMPUTER DISPLAY SYSTEMS

It is widely recognized that the ability to build data processors has outstripped equipment for input and output. The input problem is now receiving considerable attention with the development of improved message entry devices, print and magnetic ink character readers and exploratory work in general pattern recognition. This comment concerns the output problem which has received attention by the military but not much among commercial users.

The paper route for decision-making

At the present time most users depend upon the following (somewhat archaic) output procedures:

- A report is prepared on a high speed printer
- The report is reproduced
- The data is communicated to the decision-maker by distribution of the reports
- The reports are filed
- The decision-maker, when he needs data to make a decision, has the proper report located, and then locates the proper entries in the report to find the data he needs.

Note that this procedure involves three basic functions:

1. Symbol generation: the binary-coded data from the computer is converted to human-intelligible form by use of the printer.

2. Filing: the output data is stored until needed. Since the user wants the data rapidly when he is about to make a decision, a rapid and therefore random access file is preferred.

3. Distribution: the data is communicated from the computer to the users.

A finger on the pulse, figuratively speaking

Can these functions be mechanized? Of course, and they have been for many military applications. In making decisions affecting critical events (such as national defense) and/or rapidly moving situations (such as air traffic), the ponderous output method described above is too slow. Instead the following kind of procedure is used:

- The computer prepares the output data; performing all necessary file reference and computation.

- This data, instead of being printed, is entered into a random-access file. Units based on magnetic disc or magnetic card techniques can be used for this. Files of 10 to 70 million characters are available with access times of 1/2 second or less. Such a file can store 10,000 to 50,000 complex "display" records.

- The user requests a particular display or output by designating the class of information on a keyboard. A request would be in the same form (with a more precise format) as is used by an executive in submitting a request to a clerk or staff member. Examples are:

> Sales of product X by months for the past year, by territories
>
> All aircraft flying over 10,000 ft. in sector X
>
> The present location of all shop orders reflecting end item 172.

- The computer (either a central computer or a special display processor) selects the records from the output file which will answer the request and transfers it to the display system.

- A symbol generator creates visual patterns from the binary coded data. The code for a "one" (e.g., 010001) becomes the familiar pattern "1." A printer or typewriter can be used for this, but there are now many electronic symbol generators on the market. These have the main advantage of being able to generate many symbols in addition to letters and numbers--as many as 250. For example, triangles, airplane shapes, army flag symbols, and, most important, line drawings can be created. Furthermore, the symbols can be placed at any desired location on the display. This latter feature is especially important in producing geographically oriented displays or graphs. Proper use of symbols aids in rapid user comprehension.

- Finally, while still in electronic form the data can be transmitted to the user where it is displayed as legible patterns. Large displays for group use, as well as individual displays, can be created.

A completely automatic output display system is not always economically justified; but it is technically well within the state-of-the-art and should be considered where speed and accuracy are necessary for effective decision-making.

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R. A. Barker, "Techniques of Dynamic Display," Part I, Feb. 1960; Part II, April 1960; Part III, June 1960; Control Engineering

H. Epstein, "The Electrographic Recording Technique," Proceedings of the Western Joint Computer Conference, Los Angeles, March 1955

J. J. Josephs, "A Review of Panel-Type Display Devices," Proceedings of I.R.E., Vol. 48, No. 8, pages 1380-1395, August 1960

Training

Engineering and Management Course, presented by University of California at Los Angeles

Date: January 23--February 2, 1961
Place: UCLA Campus
Fee: $450
Information: Reno R. Cole, Coordinator, The Engineering and Management Course, College of Engineering, University of California, Los Angeles 24, California

Operations Research for Managers, sponsored by Case Institute of Technology

Date: January 24-28, 1961
Place: Cleveland, Ohio, Case Institute of Technology
Fee: $225
Information: Herbert B. Schultz, Jr., Manager of Special Programs, Case Institute of Technology, University Circle, Cleveland 6, Ohio

Engineering Executive Program, presented by University of California at Los Angeles

Date: Beginning September, 1961
Place: University of California at Los Angeles, California
Fee: $350 for each semester
Requirements: Applicants must meet the acceptance standards of the Graduate Division of UCLA, and must have at least 5 years full time industrial experience.

Deadline: Applications must be submitted by March 1, 1961
Information: The Engineering Executive Program, Dept. of Engineering, Room 4173C Engineering Bldg. Unit I, University of California, Los Angeles 24, California

Meetings

1961 Detroit Business Show
Date: May 2-4, 1961
Place: Detroit, Michigan (Cobo Hall)
Information: The Detroit Business Show, 817 Penobscot Building, Detroit 26, Michigan

Association for Computing Machinery National Conference
Date: September 6-8, 1961
Place: Los Angeles, California (Statler-Hilton Hotel)
Information: A. C. M. 1961 National Conference, P. O. Box 1437, Santa Monica, California

References

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